REMARKS

Claims 1-10 are all the claims currently pending in this Application.

References

The Examiner has indicated that the references that are listed in the SB/08 filed with the National Stage Entry on July 14, 2005 were not provided by the International Bureau.

Therefore, with this filing, Applicants provide copies of JP 2002-333536, JP 2002-243935, JP 2002-303836, JP 06-311114, JP 2000-121987, and JP 2003-279764, along with English abstracts thereof. EP 997751, which is in English is also provided. Additionally, the following non-patent literature documents and full translations are provided:

Suguru ASANO, Masamitsu MOCHIZUKI, Hosho SO, Susumu NODA, "2 Jigen Photonic Kessho ni yoru Hacho Bungoha Device -Men'nai e Tero Kozo no Teian-", Dai 49 Kai Oyo Butsurigaku Kankei Rengo Koenkai Koen Yokoshu, No.3, 29p-L-9, 2002.03, page 1039

Masahiro MORI, Toshihiko BABA, "Chirp Kozo o Motsu Photonic Kessho Doharo no Kento", Dai 50 Kai Oyo Butsurigaku Kankei Rengo Koenkai Koen Yokoshu, No.3, 28p-YN-1, 2003.03, page 1130

HOSOMI K., KATSUYAMA T., A Dispersion Compensator Using Coupled Defects in a Photonic Crystal, IEEE J.Q.Electron., Vol.38, No.7, July 2002, pages 825 to 829

U.S. Publication 2002-0021878 is a U.S. reference and is therefore not provided.

In view of the provision of these documents, Applicants respectfully request that the Examiner consider all of these references and provide Applicants with a duly signed and initialed copy of the original SB/08 with the next Office communication.

Claim Amendments

With this Amendment, claims 1 and 10 are amended to correct informalities and to explicitly recite within the claim what was believed to have already been implicitly defined therein.

Entry of these amendments is respectfully requested.

Claim Objection

Claim 1 is objected to due to informalities. Applicants submit that the amendments to claim 1 made herein address and correct those informalities. Applicants respectfully request that the objection to claim 1 be reconsidered and withdrawn.

Prior Art Rejections

Claim 1 is rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Hosomi (U.S. Patent 6,731,846) in view of Heitmann (U.S. Patent 6,760,513). claims 2-7 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Hosomi, Heitmann, and Lee (U.S. Patent 6,931,189). Claims 8-10 are rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Hosomi, Heitmann, Lee, and Ido (U.S. Patent 5,570,439). Applicants respectfully traverse these rejections.

Applicants submit that none of the cited references, either alone, or in combination, teaches or suggests "dispersion varying means ... for making variable the sign of chromatic dispersion independent of the absolute value of the chromatic dispersion" as recited in independent claim 1 or "a dispersion varying means which ... makes the absolute value and the sign of chromatic dispersion independently variable" as recited in independent claim 10. With reference to the Attached figures shown on page 10 herein, Applicants' explanation is as follows:

The Examiner acknowledges that Hosomi fails to disclose this limitation, but states that "Heitmann, on the other hand, discloses in Figures 3 and 5 equivalent structures (NLO_1-NLO_n) for varying the sign of the chromatic dispersion independently from varying the absolute value of the chromatic dispersion." (Office Action, p. 3) However, Applicants submit that the Examiner is mistaken. By carefully studying Heitmann, it is apparent that varying the sign of the chromatic dispersion independently from the absolute value of the chromatic dispersion is not taught or suggested.

In accordance with Heitmann, it is possible to vary the sign of the chromatic dispersion only by producing other devices, but it is not possible to vary the sign of the chromatic dispersion in a singe device by changing a means such as voltage or the like.

In accordance with Figure 1 and col. 3 of Heitmann, a structure is disclosed in which a plurality of photonic crystals KS1 to KSn is aligned in series. Each of the photonic crystals is set to reflect a specific wavelength from among incident signals which enter by passing through an optical circulator. Each photonic crystal transmits all but one specific wavelength. The distance the light travels to reach each of the photonic crystals grows longer from KS1 to KSn. Thus, because each of the crystals KS1 to KSn reflects a different wavelength, the distance the light travels varies by wavelength.

When each of the wavelengths reflected by the photonic crystals KS1 to KSn are $\lambda 1$ to λn, the traveling time of the light becomes longer from $\lambda 1$ to λn. Thus, a negative chromatic dispersion is generated.

Figure 2 of Heitmann shows a transmission spectrum of an extracted part in which photonic crystals KSi, KSi+1, and KSi+2 are aligned in this order. As the light travels from the

optical circulator in the order of KSi, KSi+1, and KSi+2, the distance the light has traveled becomes longer. When a one-way optical path length associated with only KSi is described, a traveling time Li of light returning from the reflection by KSi is delayed by τi as compared to a traveling time of light returning from a reflection by KSi-1 (the photonic crystal prior to KSi).

The one-way optical path length from a reflection by KSi+1 is described as Li+Li+!, and the delay time due to the round trip is described as τi+τi+1. The wavelengths of light reflected by each of the photonic crystals becomes longer from KSi to KSi+1, to KSi+2, whereby a negative chromatic dispersion is generated.

In Figure 2 of Heitmann, although a right-most wavelength is described as λi+n, considering the description in column 3 of Heitmann, it should be described as λi+2, to be logically consistent.

In Figure 3 of Heitmann, variable dispersion shifters for each of the photonic crystals are provided. The variable dispersion shifter inherently functions as a phase shifter — in other words, functions to provide fins adjustments to each optical path length Li, whereby, delay time in which the light returns after the reflection is finely adjusted and thereby makes the absolute value of the chromatic dispersion variable.

On the other hand, the sign of the chromatic dispersion is predetermined by the order (sequence) by which the photonic crystals are arranged), so in a fixed system, it is not possible to change the sign of the chromatic dispersion. In order to generate a positive chromatic dispersion, it would be necessary to align the crystals in a reverse order, i.e. from KSi+2, to KSi+1, to KS1. Therefore each time the sign of the chromatic dispersion is to be changed, it is necessary to prepare a new waveguide to replace the existing one.

In contrast, according to exemplary embodiments of the present invention, the photonic crystals are aligned in series, but they are not reflective — each photonic crystal transmits all wavelengths of light. That is, even with a change in wavelength, the distance traveled remains the same. Thus, the photonic crystals are used as a medium that generates chromatic dispersion. On the other hand, in Heitmann, the photonic crystals are used as reflectors and the chromatic dispersion is generated based on the difference in distance traveled by the different wavelengths of light. Thus, Heitmann operates according to a different principle from embodiments of the present invention. As a result, the effect of the embodiments of the present invention — changing the sign of the chromatic dispersion independently of the absolute value of the chromatic dispersion — is not achieved in Heitmann.

Thus, Applicants submit that according to the teachings of Heitmann, it is not possible to vary the sign of chromatic dispersion independently from varying the absolute value of the chromatic dispersion. As noted, the Examiner acknowledges that Hosomi fails to disclose this limitation. Applicants submit that Lee and Ido also fail to remedy this deficiency of Heitmann.

Therefore, in view of the above, Applicants submit that claims 1 and 10 are patentable over any combination of the cited references and that claims 2-9 are patentable at least by virtue of their dependence on claim 1.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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23373
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Date: November 6, 2007

Attached figures

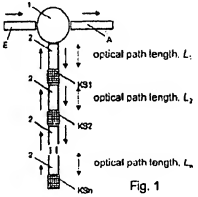

Fig. 1

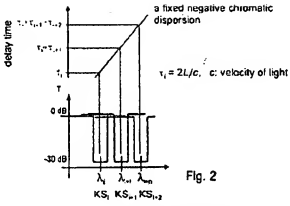

Fig. 2

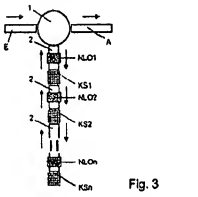

Fig. 3

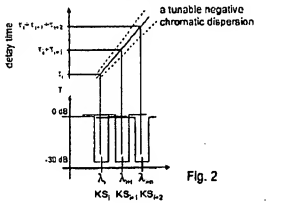

Fig. 2